

FINAL REPORT

Limited Scope Indoor Air Quality Survey

SSMC II

for

National Oceanic & Atmospheric Administration

Sampling Conducted at Building SSMC-2

On March 16, 2000

Interagency Agreement #: D8H00CO36100

Task: 9903

May 31, 2000

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Executive Summary

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) collected indoor air quality measurements for temperature, relative humidity, carbon

dioxide, carbon monoxide, and airborne fungal spores throughout Building SSMC-2, located at 1315 East-West Highway, Silver Spring, Maryland. Measurements were taken on March 16, 2000 following the methodology described below.

Temperatures throughout the building ranged from 70-77 °F. Indoor relative humidity ranged from 21-38.7%.

Current guidelines of the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 55-1995 (Thermal Environmental Conditions for Human Occupancy) recommend temperatures in the range of 68-75°F in winter season and 73-79°F summer season, along with maintaining 30 - 60% relative humidity. These ranges are based on a 10% dissatisfaction criterion.

Building temperatures were generally within the ASHRAE recommended range. Relative humidity was generally (96 of 132 datapoints) below 30%.

In general, carbon dioxide measurements provide an indicator of available “fresh air” in the space. Current standards describe indoor carbon dioxide levels below 850 ppm (AIHA), or 1000 ppm (ASHRAE 62-1999) as generally acceptable. Carbon dioxide measurements throughout the building ranged from 425-1146 ppm. Carbon dioxide levels exceeding 850 ppm were found on floors 3,5,6,7,8,9,10,11,16,17,& 18.

Since there were no combustion sources in the building, carbon monoxide levels were as expected, between 0-2 ppm.

With regard to microbial sampling, indoor fungal levels were lower than those of outdoors and fungi detected indoors were similar to those detected outdoors. *Stachybotrys chartarum* was detected in one sample taken from the 8th floor room 8370.

Based upon this limited scope investigation, DFOH recommends the following:

- 1) The HVAC system throughout the facility should be checked to ensure all components are properly operating, and that fresh air is adequately distributed to the space.

Introduction

At the request of the National Oceanic & Atmospheric Administration (NOAA), Federal Occupational Health (FOH) performed a limited scope indoor air quality investigation of Building SSMC-2, located at 1315 East-West Highway, Silver Spring, Maryland. The purpose of the investigation was to respond to ongoing employee concerns regarding indoor air quality by taking measurements of typical air quality parameters and comparing them to current industry standards. The investigation took place on March 16, 2000. Evaluation methodologies and results are presented in the following report.

Evaluation Methods

Measurements of temperature, relative humidity, carbon monoxide, and carbon dioxide were taken in eight locations on each floor of the building as indicators of relative indoor air quality. All measurements were taken with TSI Q Trak IAQ monitors, model 8550/8551. Each floor was designated into two zones on either side of the elevator lobby. Four measurements were taken in each zone in randomly selected locations on the interior and exterior of the floor. Empty spaces were selected to control for overstated carbon dioxide levels resulting from occupants in the vicinity of the Q Trak. A strategy was designed to completely sample one side of the building from top to bottom, then the other side from bottom to top. The strategy was designed to account for time of day variations in measurements, particularly carbon dioxide measurements which often increase over the workday.

Due to the configuration and accessibility of SSMC2, no samples were collected on the first floor, and in only 4 locations on the second floor.

Air samples for fungal contamination were collected by a culturable method using Andersen[®] N-6 samplers at a flow rate of 28.3 L/min. Indoor Andersen[®] air samples were collected for 3 minutes and outdoor samples were collected for both one and three minutes. Two percent (2 %) malt extract agar (MEA) was used to recover general fungi. All plates were incubated in a 25°C incubator. Plates were examined every other day for up to 10 days to ensure the full recovery of fungi. Fungal identification was based on colony morphology, spores and conidia formation. Total fungal colonies formed on each MEA plate were counted and recorded. Fungal levels in samples were presented as colony forming units (CFUs) per measuring unit.

All sample locations are marked on facility diagrams located in Attachment E.

Standards/Criteria

The IAQ Assessment followed general guidelines specified by the Environmental Protection Agency "Building Air Quality" Guide for Building Owners and Facility Managers, and the "Industrial Hygienist's Guide to Indoor Air Quality Investigations" published by the American Industrial Hygiene Association, Technical Committee on Indoor Environmental Quality.

ASHRAE Standard 55-1995 (Thermal Environmental Conditions for Human Occupancy) recommends temperatures in the range of 68-75⁰F in winter season and 73-79⁰F Summer season. These ranges are based on a 10% dissatisfaction criterion. The recommended relative humidity range is 30 - 60%.

Carbon monoxide levels should be 0-2 parts per million (ppm) above ambient, < 9 ppm average. Carbon Dioxide levels should remain < 850 ppm ("Industrial Hygienist's Guide to Indoor Air Quality Investigations" published by the American Industrial Hygiene Association, Technical Committee on Indoor Environmental Quality).

There are no "standards" for building microbial burden. Complaint areas are generally compared with non-complaint areas and outside air.

Results and Conclusions

Temperature, relative humidity, carbon dioxide, and carbon monoxide measurements by location are tabulated in Attachment A.

Microbial results are tabulated in Attachment B.

Temperatures throughout the building ranged from 70-77 ⁰F. Indoor relative humidity ranged from 21-38.7%.

Building temperatures were generally within the ASHRAE recommended range. Relative humidity was generally (96 of 132 datapoints) below 30%. Building humidity will likely increase during the spring and summer months. The building can be mechanically humidified to levels of 30-60%, however, this

may not be advisable based upon building history and the presence of fungal spores.

Carbon dioxide measurements throughout the building ranged from 425-1146 ppm. Carbon dioxide levels as a function of time of day were graphed for the entire building to determine if levels increase over time. The graph shows a trend toward increasing levels throughout the day.

Carbon dioxide levels as a function of time were then graphed on a floor by floor basis. These graphs are located in Attachment D. Graphs for individual floors also show a trend toward increasing carbon dioxide levels throughout the day.

Carbon monoxide levels throughout the facility were consistently 0-2 ppm.

Recommendations

Based upon this limited scope investigation, DFOH recommends the following:

- 1) The HVAC system throughout the facility should be checked to ensure all components are properly operating, and that fresh air is adequately distributed to the space.

Attachment A

IAQ Measurements

Attachment B

Microbial Sample Results

Attachment C
CO2 vs. Time Graph

Attachment D
Floor by Floor
CO2 Vs. Time Graphs

Attachment E
Facility Diagrams